

DETAILS OF THE WEATHER IN THE UNITED STATES.

GENERAL CONDITIONS.

ALFRED J. HENRY.

The most striking feature of the weather of the current month was the failure of the rains generally east of the Mississippi. The drought was exceptionally severe in Pennsylvania, the western portion of which had not received substantial rains since March of the present year. November precipitation is known to be light, especially in the interior. The rather anomalous condition of the current month—drought east of the Mississippi and normal rains in the Plains States and elsewhere to the westward—was doubtless due to the movement, or rather lack of movement, of cyclones which entered the field of observations from the west and northwest. As will be noted from Chart I, anticyclones had a pronounced tendency to originate and also to stagnate over the northern Rocky Mountain and Plateau regions; outbursts of cold air proceeded thence southeastward and in the majority of cases separated the southern portion of the warm-air sector of cyclonic systems from the northern portion and thus we believe, cyclones, which normally would have moved to the northeast over Tennessee and the Ohio Valley, were deflected to the west and north and eventually passed eastward north of the Lake region—too far north to give rainfall to the States east of the Mississippi. Prevailing high pressure over southeastern States may also have been influential in causing the movement above mentioned.

CYCLONES AND ANTICYCLONES.

By W. P. DAY.

As would be expected, the pressure changes were more active during November than the preceding month. Several typical winter types of pressure distribution made their appearance. The Plateau HIGH was well developed during two periods and several important Alberta HIGHS were plotted. Among the low-pressure areas, important southwest lows and South Atlantic LOWS were charted. No tropical storms were noted. The number of cyclones (LOWS) and anticyclones (HIGHS) by types is shown in the table below.

Cyclones.	Al-ber-ta.	North Pa-cific.	South Pa-cific.	North-ern Rocky Moun-tain.	Colo-rado.	Texas.	East Gulf.	South At-lantic.	Cent-ral.	Total.
November, 1922..	6.0	.....	1.0	.....	4.0	1.0	.....	2.0	.....	14.0
Average num-ber, 1892-1912, inclusive.....	4.0	2.3	0.6	0.4	1.1	1.0	0.4	0.8	1.0	11.6

Anticyclones.	North Pacific.	South Pacific.	Alber-ta.	Plateau and Rocky Moun-tain region.	Hudson Bay.	Total.
November, 1922.....	4.0	.....	6.0	2.0	1.0	13.0
Average number, 1892-1912, inclusive.....	2.0	0.9	4.0	1.1	0.2	8.2

FREE-AIR CONDITIONS.

By L. T. SAMUELS.

Free-air observations for the month presented no striking features of more than local importance, but rather they showed a nearly normal state of affairs, especially as regards free-air winds. Free-air temperatures (see Table 1) showed a general excess as compared with the normal for practically all stations and levels explored by the kites, with the largest departures occurring at Ellendale. At this station, however, a large proportion of the flights was made at a later hour in the day than usual, and therefore at times when the temperature was ordinarily higher.

Relative humidities showed small departures in nearly all cases, and vapor pressure departures conformed generally with those for temperature.

In Table 2 are given the resultant winds and their normal values. The close agreement, in most cases, between the former and the latter is striking, the one exception being Groesbeck, where considerable deviation is found at a number of levels.

The following stations reported velocities of 40 m. p. s. or more:

Station.	November.	Velocity.	Direction.	Altitude.
Aberdeen, Md.....	24	m. p. s. 50	WNW	m. 4,100
Broken Arrow, Okla.....	16	40	WSW	8,000
Do.....	22	44	WSW	10,300
Dahlgren, Va.....	24	47	WNW	3,900
Due West, S. C.....	16	59	WNW	10,000
Lansing, Mich.....	9	41	NW	8,500
Mitchel Field, N. Y.....	24	50	WNW	2,700

Easterly winds at heights above 5,000 meters were observed as follows:

Station.	November.	Station.	November.
Bolling Field, D. C.....	1	Key West, Fla.....	1, 2, 7, 16, 19
Denver, Colo.....	24	San Francisco, Calif.....	13, 28
Edgewood, Md.....	1	San Juan, P. R.....	4, 19
Groesbeck, Tex.....	22		

Numerous occurrences in pilot-balloon observations have been noted when the velocity curve takes on an extremely zigzag form, i. e., indicating alternately high and low velocities superimposed, but with no appreciable change in direction. An inspection of the weather charts on a number of days when such conditions were pronounced gave surprisingly consistent testimony to the fact that these cases are characteristic of the region on the dividing lines between a low-pressure area passing off and a high-pressure area moving in. Some instances of the kind occurring this month were the following:

Station.	November.
Drexel, Nebr.....	5 (a. m.), 7 (a. m. and p. m.).
Dahlgren, Va.....	20 (p. m.).
Mitchel Field, N. Y.....	23 (a. m.), and 29 (p. m.).

It seems highly probable that this condition is an accompaniment of the temperature distribution of this particular arrangement of pressure and a more detailed

TABLE 2.—Free-air resultant wind directions and velocities (m. p. s.) during November, 1922.

Altitude, m. s. l. (m.)	Broken Arrow, Okla. (233m.)				Drexel, Nebr. (390m.)				Due West, S. C. (217m.)				Ellendale, N. Dak. (444m.)				Groesbeck, Tex. (141m.)				Royal Center, Ind. (225m.)			
	Mean.		5-year average.		Mean.		5-year average.		Mean.		2-year average.		Mean.		5-year average.		Mean.		5-year average.		Mean.		5-year average.	
	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.	Dir.	Vel.
Surface.....	S. 40° W.	1.4	S. 40° W.	1.1	S. 73° W.	2.7	S. 87° W.	1.4	N. 72° W.	2.6	N. 84° W.	2.2	N. 35° W.	3.0	N. 44° W.	2.2	N. 61° E.	0.9	N. 41° E.	0.3	S. 46° W.	3.5	S. 55° W.	2.6
250.....	S. 38° W.	1.5	S. 34° W.	1.2	.....	.....	.....	.....	N. 81° W.	1.9	S. 88° W.	1.8	.....	N. 65° E.	1.7	N. 78° E.	0.6	S. 46° W.	4.0	S. 52° W.	2.8	.....	.....	.....
500.....	S. 28° W.	2.5	S. 21° W.	2.2	S. 75° W.	3.3	S. 87° W.	2.0	S. 74° W.	0.9	S. 74° W.	1.6	N. 41° W.	3.1	N. 55° W.	2.3	N. 88° E.	2.9	S. 33° E.	0.9	S. 58° W.	6.4	S. 63° W.	4.6
750.....	S. 30° W.	3.5	S. 25° W.	3.2	S. 81° W.	4.4	S. 89° W.	3.5	N. 86° W.	1.4	S. 75° W.	2.3	N. 43° W.	4.7	N. 55° W.	3.5	S. 79° E.	3.0	S. 15° W.	1.3	S. 62° W.	8.0	S. 60° W.	6.2
1,000.....	S. 50° W.	4.5	S. 38° W.	3.7	S. 86° W.	5.9	S. 84° W.	4.8	N. 86° W.	2.7	S. 83° W.	3.1	N. 49° W.	5.7	N. 62° W.	4.3	S. 69° E.	2.2	S. 44° W.	2.1	S. 66° W.	9.2	S. 65° W.	7.2
1,250.....	S. 55° W.	5.4	S. 48° W.	4.6	S. 87° W.	6.9	S. 89° W.	5.7	N. 89° W.	3.9	S. 87° W.	4.6	N. 56° W.	6.2	N. 66° W.	5.0	S. 28° E.	0.7	S. 59° W.	3.0	S. 71° W.	10.1	S. 68° W.	8.2
1,500.....	S. 54° W.	6.3	S. 57° W.	5.1	S. 79° W.	8.3	N. 88° W.	6.8	S. 87° W.	5.5	S. 88° W.	6.0	N. 62° W.	6.7	N. 66° W.	6.3	S. 39° W.	2.1	S. 67° W.	4.0	S. 73° W.	10.9	S. 71° W.	8.8
2,000.....	S. 62° W.	5.9	S. 64° W.	6.9	S. 84° W.	10.1	N. 84° W.	7.7	S. 85° W.	7.2	S. 86° W.	8.4	N. 63° W.	8.5	N. 66° W.	8.2	S. 56° W.	4.4	S. 69° W.	5.7	S. 83° W.	12.1	S. 78° W.	10.3
2,500.....	S. 73° W.	7.3	S. 73° W.	7.7	N. 87° W.	11.7	N. 81° W.	9.4	S. 81° W.	9.6	S. 82° W.	10.5	N. 59° W.	12.0	N. 65° W.	11.1	S. 66° W.	5.9	S. 84° W.	7.5	S. 84° W.	13.1	S. 80° W.	12.4
3,000.....	S. 64° W.	9.6	S. 72° W.	9.6	S. 87° W.	13.5	N. 79° W.	10.7	S. 88° W.	12.7	S. 85° W.	13.8	N. 57° W.	12.5	N. 66° W.	12.9	S. 62° W.	8.2	S. 83° W.	9.0	N. 87° W.	13.0	S. 88° W.	14.1
3,500.....	S. 62° W.	11.2	S. 70° W.	10.1	N. 75° W.	12.6	N. 76° W.	11.4	S. 84° W.	13.8	S. 86° W.	14.7	N. 53° W.	13.5	N. 65° W.	13.8	S. 56° W.	9.8	S. 69° W.	11.4	N. 74° W.	19.4	N. 89° W.	12.9
4,000.....	S. 70° W.	11.0	S. 77° W.	11.8	N. 83° W.	14.6	N. 80° W.	13.3	N. 81° W.	17.7	N. 82° W.	16.3	N. 68° W.	15.3	N. 62° W.	12.4	S. 18° W.	9.2	S. 64° W.	9.3	.....	.....	.....	.....
4,500.....	S. 58° W.	11.4	S. 61° W.	14.2	N. 79° W.	16.2	N. 86° W.	14.5	.....	19.3	N. 76° W.	18.0	N. 68° W.	16.8	N. 50° W.	15.7	S. 28° W.	9.3	S. 62° W.	9.7	.....	.....	.....	.....
5,000.....	S. 45° W.	12.3	S. 45° W.	12.3	S. 45° W.	18.6	S. 85° W.	15.6	.....	.....	.....	.....	.....	.....	.....	S. 22° W.	7.5	S. 68° W.	10.1	.....	.....	.....	.....

THE WEATHER ELEMENTS.

By P. C. DAY, Meteorologist, in Charge of Division.

PRESSURE AND WINDS.

During November the continental high pressure, common to the colder period of the year, usually assumes a more definite type than is apparent during the preceding month, and the somewhat permanent high areas over the southeastern States and in the far Northwest increase both in area and magnitude. At the same time there is a general increase in pressure over that existing during October in practically all portions of the country. The only exception to this is found over extreme northwestern Washington, where the increasing storm activity, due to the approach of winter, tends to reduce the average pressure below that of October.

For the present month pressure in both Canada and the United States was everywhere greater than during the preceding month, and the differences were distinctly larger than is usually the case, particularly over the far Northwest and to a somewhat less extent in all southern districts. Pressure averages were likewise well above the normal over all western and southern districts, but they were slightly less than normal over portions of the upper Mississippi Valley, Lake region, and to the eastward.

While changes in atmospheric pressure were rapid and cyclones and anticyclones moved across portions of the country at more frequent intervals than is usual, the pressure gradients were mainly insufficient to produce high winds. On the morning of the 4th, however, a storm that had moved from northern Arizona and southern Utah to southeastern Colorado during the preceding 24 hours developed conditions favorable for local high winds in the middle Plains and adjacent regions during that and the following day, a severe tornado being reported from eastern Colorado on the 4th, attended by the loss of several lives and heavy damage to property. (A more complete account of this storm will be found on page 605 in this REVIEW.)

Some high winds occurred over the North Atlantic coast sections during the last decade of the month, and at the close a severe storm was approaching the Great Lakes, and high winds prevailed from the lower Missouri Valley to the Lake Superior region.

The high-pressure area over the Southeastern States had its center of greatest pressure in the southern Appalachian Mountain district and greatly influenced the prevailing winds to eastward of the Mississippi River, the winds around the central high area assuming the usual anticyclone movement. Likewise there was the usual movement around the high area central over the northern Plateau and northern Rocky Mountain region. The prevailing winds were usually from the northwest in the upper Missouri Valley and from southerly points in the middle Plains. In the far Southwest and in central and southern Texas they were mainly from northerly points.

TEMPERATURE.

As was the case in October, the outstanding feature of the weather of the month was the continued absence of uncomfortable cold over the districts from the Rocky Mountains eastward until near the end. Over the more western districts, however, the weather was nearly continuously colder than normal during most of the month.

The first week of the month had temperatures above the normal from the middle portion of the Great Plains eastward to the Atlantic coast, the period being particularly warm in the great central valleys. West of the Rocky Mountains cold weather persisted, the weekly averages ranging from 6° to 9° daily below the normal over much of the Plateau region.

During the second and third weeks temperature conditions remained much as in the first week, though not quite so warm over the eastern districts and slightly colder than the preceding week in the central and northern Rocky Mountain regions.

The last week of the month brought a general reversal of temperature conditions, the averages falling below normal in the districts to eastward of the Mississippi River for the first time in a number of weeks, but continuing unusually warm in the Missouri Valley and adjacent areas. The week continued cool in the far Northwest, where almost constant cold had prevailed during the preceding portions of the month.

The average temperature for the month as a whole was above normal in practically all portions of the United States and Canada to eastward of the Rocky Mountains, and decidedly so from Kansas and Missouri northward, where the monthly means ranged from 5° to 10° above